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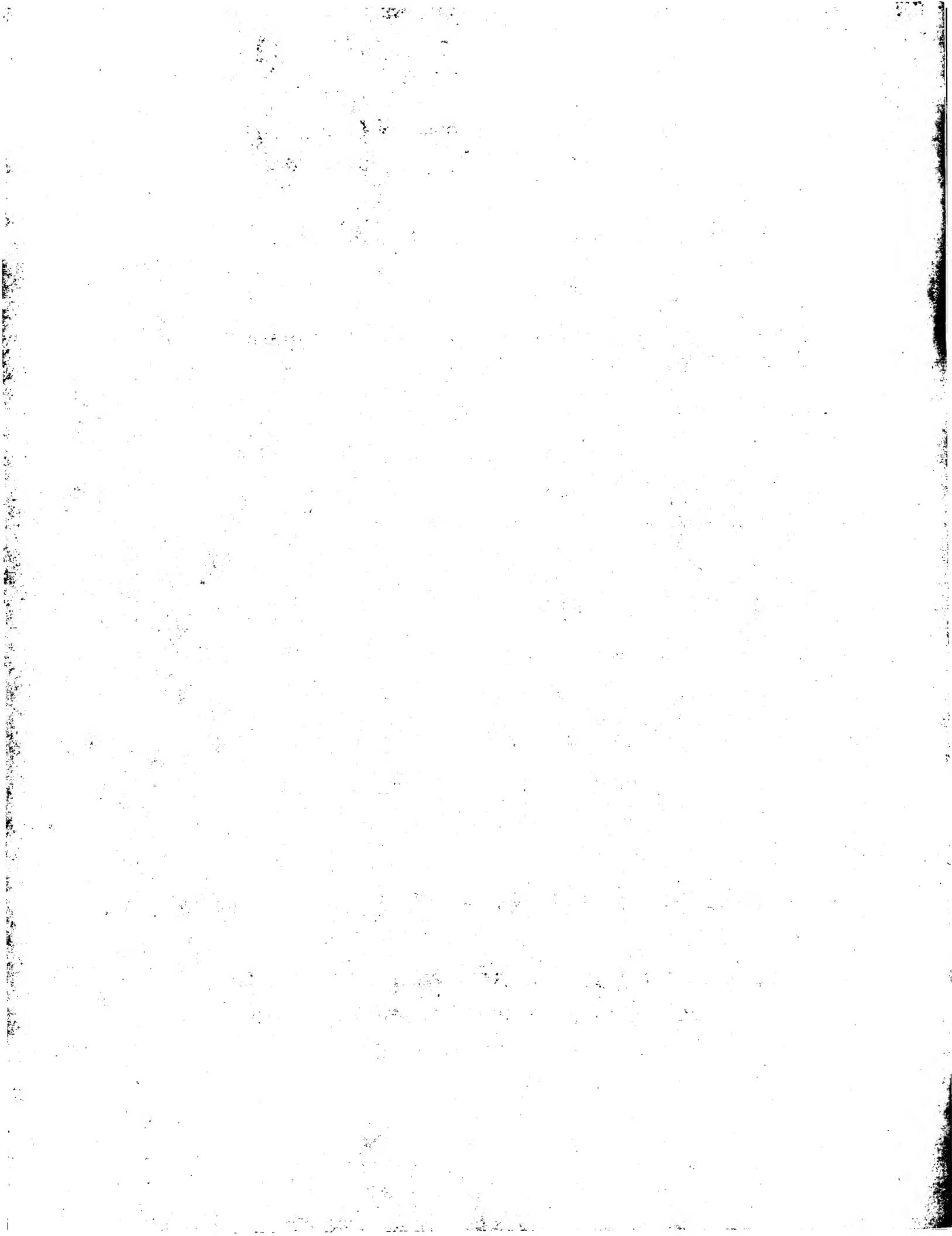
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1 355 351

PATENT SPECIFICATION

(11)

1 355 351

(21) Application No. 5912/71 (22) Filed 3 Mar. 1971
(23) Complete Specification filed 3 Mar. 1972
(44) Complete Specification published 5 June 1974
(51) International Classification D04B 1/00
(52) Index at acceptance
D1K 24A10 24A1
(72) Inventor UDO GEIPEL



(54) KNITTED FABRICS

PATENTS ACT 1949

SPECIFICATION NO 1355351

The following amendments were allowed under Section 29 on 7 May 1975:-

Page 3, line 45, delete claim 5 insert claim 4

THE PATENT OFFICE
20 June 1975

R 21880/19

interconnecting yarn knitted into the composite fabric so that needle loops of one of the fabric layers extend through respective connecting loops of the interconnecting 20 yarn, said connecting loops of the interconnecting yarn extending across to said one fabric layer from the other fabric layer.

The term "yarn" includes natural and 25 man-made monofilamentary and multifilamentary material such, for example, as cotton, wool, plastics, glass, metal and mineral, (for example, asbestos).

Preferably the two layers are knitted 30 separately but simultaneously. The composite knitted fabric may be knitted on any suitable circular or flat knitting machine using bearded or latch needles and other conventional knitting devices. One suitable 35 circular knitting machine is a machine having a set of cylinder needles and a set of dial needles, similar to the machine described in our patent specification No. 1,028,526 to which reference is directed. A 40 suitable flat knitting machine is one having two needle beds.

The interconnecting yarn or at least one 45 of the interconnecting yarns (if more than one) connecting the two fabric layers together may be one of the stitch-forming

combinations may be obtained by using 60 yarns with different crimp rigidities and/or yarns of different counts and/or by making the composite material on a knitting machine with knitting elements set differently for knitting the respective layers. 65

The said at least two yarns in each respective layer may be the same or different in colour and/or type. The two layers may advantageously be formed one of relatively fine and/or relatively expensive yarns and 70 the other of relatively coarse and/or relatively inexpensive yarns. For example, one of the layers may be of coloured yarns and the other layer of plain yarns.

At least one of the yarns may be 75 doubled with an additional yarn of the same or different colour and/or material, i.e. these two yarns being knitted as one yarn.

Preferably both of the layers are readily 80 stretchable in two directions, by virtue of each layer being an interlocked layer knitted loosely.

A composite fabric in accordance with the invention may be suitable for outer- 85 wear, under-wear, slumber-wear and/or beach-wear, for example.

In the accompanying drawings:—

Fig. 1 is an exploded view of a composite fabric embodying the invention: 90

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(54) KNITTED FABRICS

(71) We, PASOLDS LIMITED, a British Company of Langley, Buckinghamshire, do hereby declare the invention, for which we pray that a patent may be granted to us, 5 and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to knitted fabrics.

According to the invention there is 10 provided a composite knitted fabric comprising two back-to-back fabric layers, each fabric layer being an interlocked fabric layer knitted of at least two respective stitch-forming yarns, the two fabric layers 15 being interconnected by at least one interconnecting yarn knitted into the composite fabric so that needle loops of one of the fabric layers extend through respective connecting loops of the interconnecting 20 yarn, said connecting loops of the interconnecting yarn extending across to said one fabric layer from the other fabric layer.

The term "yarn" includes natural and 25 man-made monofilamentary and multifilamentary material such, for example, as cotton, wool, plastics, glass, metal and mineral, (for example, asbestos).

Preferably the two layers are knitted 30 separately but simultaneously. The composite knitted fabric may be knitted on any suitable circular or flat knitting machine using bearded or latch needles and other conventional knitting devices. One suitable 35 circular knitting machine is a machine having a set of cylinder needles and a set of dial needles, similar to the machine described in our patent specification No. 1,028,526 to which reference is directed. A 40 suitable flat knitting machine is one having two needle beds.

The interconnecting yarn or at least one 45 of the interconnecting yarns (if more than one) connecting the two fabric layers together may be one of the stitch-forming

yarns of one of the layers or may simply extend along courses of one of the layers without forming stitches therein. The connecting loops may be spaced apart amongst stitch-forming loops of either layer 50 or of both layers.

The composite material may be tubular or flat and may be continuous or in garment lengths. It is believed that it would be extremely difficult, if not practically impossible, for the composite material to be 55 fully fashioned.

The stitch densities of the two layers may be the same or may be different. Different 60 stitch densities may be obtained by using yarns with different crimp rigidities and/or 65 yarns of different counts and/or by making the composite material on a knitting machine with knitting elements set differently for knitting the respective layers.

The said at least two yarns in each 70 respective layer may be the same or different in colour and/or type. The two layers may advantageously be formed one of relatively fine and/or relatively expensive yarns and 75 the other of relatively coarse and/or relatively inexpensive yarns. For example, one of the layers may be of coloured yarns and the other layer of plain yarns.

At least one of the yarns may be 75 doubled with an additional yarn of the same or different colour and/or material, i.e. these two yarns being knitted as one yarn.

Preferably both of the layers are readily 80 stretchable in two directions, by virtue of each layer being an interlocked layer knitted loosely.

A composite fabric in accordance with 85 the invention may be suitable for outer-wear, under-wear, slumber-wear and/or beach-wear, for example.

In the accompanying drawings:—
 Fig. 1 is an exploded view of a composite fabric embodying the invention:

90

needle loops can be seen.

With reference to the above-given explanation of "interlocked fabric", a distinction is drawn between that and "interlock fabric," which is normally understood as being a fabric having two right sides or faces looking exactly alike, knitted on a circular knitting machine having short and long needles in the cylinder and short and long needles in the dial.

WHAT WE CLAIM IS:-

1. A composite knitted fabric comprising two back-to-back fabric layers, each fabric layer being an interlocked fabric layer knitted of at least two respective stitch-forming yarns, the two fabric layers being interconnected by at least one interconnecting yarn knitted into the composite fabric so that needle loops of one of the fabric layers extend through respective connecting loops of the interconnecting yarn, said connecting loops of the interconnecting yarn extending across to said one fabric layer from the other fabric layer.

2. A composite knitted fabric as claimed in claim 1 wherein the two fabric layers are knitted separately but simultaneously.

3. A composite knitted fabric as claimed in claim 1 or 2, wherein the interconnecting yarn or at least one of the interconnecting yarns (if more than one) connecting the two fabric layers together is one of the stitch-forming yarns of one of the fabric layers.

4. A composite knitted fabric as claimed in claim 1 or 2, wherein the interconnecting yarn of at least one of the interconnecting yarns (if more than one) connecting the two fabric layers together extends along courses of one of the layers without forming stitches therein.

5. A composite knitted fabric as claimed in claim 5, wherein the connecting loops are spaced apart amongst needle loops of at least one of the fabric layers.

6. A composite knitted fabric as claimed in any one of claims 1 to 5

wherein the composite knitted fabric is 50 tubular.

7. A composite knitted fabric as claimed in any one of claims 1 to 5 wherein the composite knitted fabric is flat.

8. A composite knitted fabric as 55 claimed in any one of claims 1 to 7 wherein the stitch densities of the two layers are the same.

9. A composite knitted fabric as claimed in any one of claims 1 to 7 60 wherein the stitch densities of the two layers are different.

10. A composite knitted fabric as claimed in claim 9 wherein the yarns of which one layer is knitted each have a 65 crimp rigidity different from the crimp rigidity of either or each of the yarns of which the other layer is knitted.

11. A composite knitted fabric as claimed in claim 9 or 10 wherein the yarns 70 of which one layer is knitted each have a count different from the count of either or each of the yarns of which the other layer is knitted.

12. A composite knitted fabric as 75 claimed in any preceding claim wherein the two layers are formed one of relatively fine and/or relatively expensive yarns and the other of relatively coarse and/or relatively inexpensive yarns.

13. A composite knitted fabric as 80 claimed in any preceding claim wherein at least one of the yarns is parallel with an additional yarn of the same or different colour and/or material, these two yarns being 85 knitted as one yarn.

14. A composite knitted fabric as 90 claimed in any preceding claim wherein both of the layers are readily stretchable in two directions, each layer being an interlocked layer knitted loosely.

15. A composite fabric substantially as described with reference to the accompanying drawings.

MARKS & CLERK,
Chartered Patent Agents,
Agents for the Applicants.

Fig. 2 is a diagrammatic illustration of the fabric shown in Fig. 1; and

Fig. 3 is another diagrammatic illustration of the fabric shown in Fig. 1.

5 The composite fabric 1 illustrated in Figs. 1 to 3 comprises two back-to-back fabric layers 2 and 3. Each fabric layer 2 and 3 is an interlocked fabric layer knitted of two stitch-forming yarns, i.e. yarns 4
 10 and 5 for layer 2 and yarns 6 and 7 for layer 3, as shown. The fabric layers 2 and 3 are connected together by connecting loops 8 (formed by extended sinker loops) of stitch-forming yarn 6 of layer 3 ex-
 15 tending across to the fabric layer 2 from the fabric layer 3 and by needle loops 9, (not necessarily all in the same course, nor necessarily all of the same yarn,) of the fabric layer 2 extending through respective
 20 connecting loops 8.

The similarity of the fabric 1 to the fabric described and illustrated in patent specification No. 1,028,526 will be apparent and, in a sense, the present invention re-
 25 presents an improvement in or modification of the invention which is the subject of patent specification No. 1,028,526. However, it is not essential for the stitch den-
 30 sities of the two fabric layers 2 and 3 to be different, and the composite fabric 1 may be knitted on a flat knitting machine having two needle beds as an alternative to a circular knitting machine having a cylinder and dial.

35 The density of the connecting loops 8 may be greater or less than that shown, and the connecting loops 8 may or may not extend straight across from the layer 3 to the directly opposite needle loops 9 of
 40 the layer 2. That is to say, the general direction of each connecting loop 8 may be other than perpendicular to the plane of the fabric 1.

By virtue of each of the fabric layers 2
 45 and 3 being a two-yarn "interlocked fa-
 bric" layer of plain web formation, with correspondingly long sinker loops such as 10 between successive needle loops 11 and 12 of the yarn 6, for example, (yarns 4, 5
 50 and 7 similarly having long sinker loops,) the fabric 1 has considerable stretchability both horizontally and (particularly) vertically as seen in the drawings.

With reference to the use of the term
 55 "interlocked fabric" to describe each of the layers 2 and 3, it may be observed that the yarn 6 by itself is knitted so as to form a layer which would still exist even if the
 60 yarn 7 were removed. Likewise the yarn 7 is knitted so as to form a layer which would exist if the yarn 6 were removed. The respective layers formed by the yarns
 65 6 and 7 are "interlocked" so as to form the interlocked fabric layer 3, in which successive needle loops such as 11 and 13

are of different yarns, namely, yarns 6 and 7, to provide the long sinker loops such as 10 and consequent stretchability of the layer 3. It is permissible for the yarn 6 or 7, or for each of the yarns 6 and 7, to be doubled with another yarn, not shown, and for the doubled yarns to be knitted as one yarn, so that each needle loop thereof is of two yarns:

The connecting of the layers 2 and 3 together by means of the extended sinker loops 8, forming connecting loops, may be described as "seam knitting", since it is in some respects similar to seaming carried out by certain types of sewing machines, notably chain-stitch sewing machines. This seam knitting may be carried out simply by means of a tuck stitch or by means of a full size plain web stitch. The spacings between connecting loops may be regular 85 or irregular.

Instead of, or in addition to, the connecting loops 8 drawn from the layer 3, connecting loops (not shown) may be drawn from the layer 2 to extend therefrom across the layer 3, with needle loops of layer 3 extending through these last-mentioned connecting loops. That is to say, the connecting loops may be formed by means of either or both needle beds in the case of a flat knitting machine or of either or both of the cylinder and dial in the case of a circular knitting machine. The two layers 2 and 3 are knitted separately (by means of respective sets of needles) but simultaneously and closely together, so that the connecting loops 8 are made the correct length at the time of being formed.

One particular composite fabric embodying the invention has an outer layer of white yarns and an inner layer of dark yarns. The white outer layer may be coloured with a print, achieving great colour brightness without the composite fabric becoming transparent. Such a fabric is especially suitable for swimwear, since one can economise by not using a separate lining.

Another composite fabric has a strong outer layer knitted from yarns of one type and a soft inner layer knitted from yarns of another type.

Each layer may if desired be knitted from three yarns each forming its own knitted layer interlocked with the two layers formed respectively by the other two yarns. In this case, each sinker loop would be relatively half as long again as each of the sinker loops such as 10 shown in Figure 1, resulting in still greater 125 stretchability in all probability.

The "back" of a fabric layer is the side where the sinker loops can be seen undisturbed, as distinct from the face of the fabric layer which is the side where the 130

1355351 COMPLETE SPECIFICATION

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Sheet 1

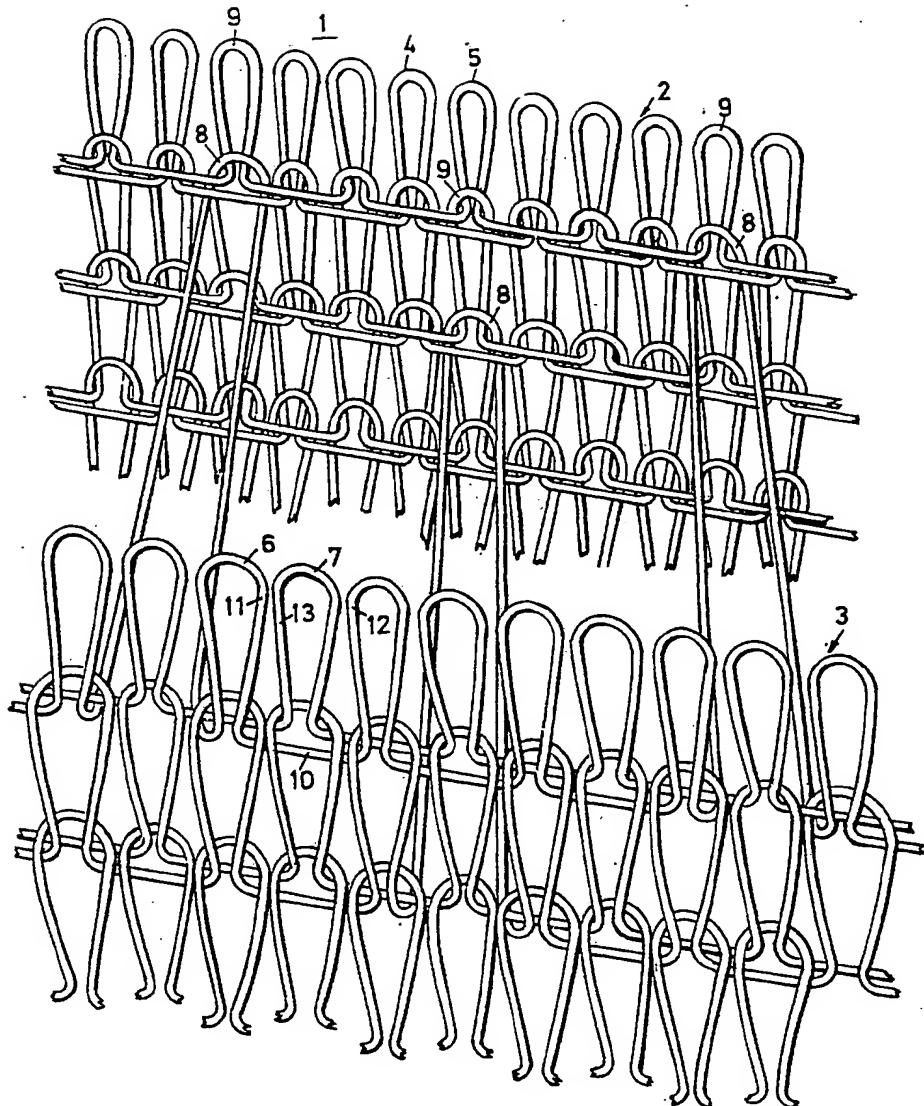


FIG.1.

1355351 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of
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Sheet 2

FIG. 2.

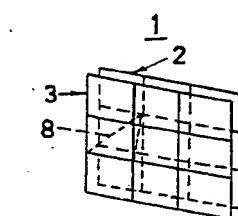
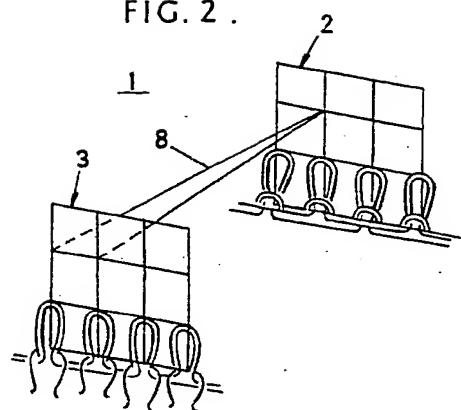


FIG. 3.